

## REMARKS

Reconsideration of the above-identified patent application in view of the amendments above and the remarks following is respectfully requested.

Claims 1, 4-9, 11, 12, 14, 16-31, 34-39, 41, 42, 44, 46-59 and 64-66 are in this case. Claims 20-30 and 50-59 were withdrawn by the Examiner from consideration as drawn to a non-elected invention. Claims 1, 4-9, 11, 12, 14, 16-19, 31, 34-39, 41, 42, 44, 46-49 and 64-66 have been rejected on the grounds of nonstatutory obviousness-type double patenting. Claims 1, 4-9, 11, 12, 14, 16-19, 31, 34-39, 41, 42, 44, 46-49 and 64-66 have been rejected under § 103(a). New claims 67 and 68 have been added.

Specifically:

New claims 67 and 68 have been added to restore to claims 1 and 31, respectively, the limitation, that the gather engine gathers the write data and the read data via a common data flow path, that was deleted from claims 1 and 31 in response to the Office Action mailed January 17, 2008.

### **§ 103(a) Rejections – Pettey et al. ‘712 in view of Pettey ‘544**

The Examiner has rejected claims 1, 4, 5, 7, 9, 12, 14, 16-19, 31, 34-38, 42, 44, 46-49 and 64-66 under § 103(a) as being unpatentable over Pettey et al., US Patent No. 6,594,712 (henceforth, “Pettey et al. ‘712”) in view of Pettey, US Patent Application Publication No. 2003/0014544 (henceforth, “Pettey ‘544”). The Examiner’s rejection is respectfully traversed.

In order for independent claims 1 and 31 to be unpatentable over Pettey et al. ‘712 in view of Pettey ‘544, these references must teach or suggest every recited

limitation. As the Board of Patent Appeal and Interferences has confirmed in *In re Wada and Murphy*, Appeal 2007-3733,

When determining whether a claim is obvious, an examiner must make “a searching comparison of the claimed invention – including all its limitations – within the teaching of the prior art”. *In re Orchiai*, 71 F.3d 1565, 1572 (Fed. Cir. 1995) (emphasis added). Thus, “Obviousness requires a suggestion of all limitations in a claim.” *CFMT, Inc. v. Yieldup Intern. Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003) (citing *In re Royka*, 490 F.2d 981, 985 (CCPA 1974)).

In the present case, neither Pettey et al. ‘712 nor Pettey ‘544 teach, hint or suggest a gather engine that gathers both write data and read data from a system memory for inclusion in outgoing packets via a commonly shared data flow path. The Examiner himself has acknowledged that Pettey et al. ‘712 lacks such a teaching, insofar as the Examiner has cited only Pettey ‘544 as teaching a gather engine. Specifically, the Examiner has cited Figure 8 of Pettey ‘544 as teaching a gather engine. Figure 8 of Pettey ‘544 does not teach a gather engine as such, but only the *logical* structure of host channel adapter **850**. As best understood, host channel adapter **850** is configured according to the prior art architecture described in the paragraph starting on page 3 line 22 of the specification of the above-identified patent application: a dual pipeline architecture with independent microprocessors and DMA engines for separate receive and transmit data paths. By contrast, the gather engine recited in independent claims 1 and 31 is a component of “common hardware resources” (page 4 line 21) that handles “both requester and responder communication flows” (page 4 lines 20-21). Specifically, the general operation of the gather engine is described on page 5 lines 8-26 of the specification as follows:

By the same token, in generating RDMA write and send requests to a remote responder, as in preparing RDMA read responses to send to a remote requester, the HCA “gathers” data from the local memory and sends it in packets to a remote destination. Client processes on the local host generate write and send requests by submitting WRs to the HCA, so that WQEs are placed in the

appropriate HCA queues. A gather engine services the WQEs by reading the specified data from the local memory and inserting the data in request packets for transmission. To conform to this model, when the HCA receives RDMA read requests from a remote requester, it similarly generates a list of quasi-WQEs in local memory, which identify the data to be sent to the requester. These quasi-WQEs differ semantically from the WQEs generated by the local host, but they are handled by the HCA in the same way. The quasi-WQEs are serviced by the same gather engine that is responsible for servicing the write and send requests. (emphasis added)

New claims 67 and 68 have been added to reinforce this distinction between the present invention and the prior art cited by the Examiner, by specifying that the gather engine includes both the write data (of the WQEs) and the read data (of the quasi-WQEs) in their respective packets via a commonly shared data flow path.

With independent claims 1 and 31 allowable in their present form it follows that claims 4, 5, 7, 9, 12, 14, 16-19, 34-38, 42, 44, 46-49 and 64-66 that depend therefrom also are allowable.

**§ 103(a) Rejections – Pettey et al. ‘712 in view of Pettey ‘544 and Gasbarro et al.**

**‘004**

The Examiner has rejected claims 6, 8, 11, 39 and 41 under § 103(a) as being unpatentable over Pettey et al. ‘712 in view of Pettey ‘544 and Gasbarro et al, US Patent No. 6,948,004. The Examiner’s rejection is respectfully traversed.

It is demonstrated above that independent claims 1 and 31 are allowable in their present form. It follows that claims 6, 8, 11, 39 and 41 that depend therefrom also are allowable.

### **§ 103(a) Rejections – Applicant Admitted Prior Art**

The Examiner has rejected claims 1 and 31 under § 103(a) as being unpatentable over Applicant Admitted Prior Art (henceforth, “AAPA”). The Examiner’s rejection is respectfully traversed.

In rejecting claims 1 and 31 as unpatentable over AAPA, the Examiner has repeated claim 1, annotated to correlate the various elements of claim 1 with AAPA. Therefore, the following arguments concentrate on claim 1. Similar arguments demonstrate the allowability of claim 31 over AAPA.

At least one of the Examiner’s annotations of claim 1 is erroneous. Nothing in AAPA correlates with the claim element

wherein the incoming packet processor is adapted to write a response descriptor to a first memory location, in a memory separate from the network interface adapter, indicating the data to be read from the system memory responsive to the incoming read request packet (emphasis added)

This claim element recites the quasi-WQEs that the HCA writes in response to the receipt of RDMA read requests. Such quasi-WQEs are totally absent from AAPA. AAPA teaches (page 2 lines 8-12) only WQEs posted by client processes running on the host of the HCA. Quasi-WQEs, as described *e.g.* in the above citation from page 5 lines 8-26, are among the improvements over AAPA that are taught in the specification and are neither taught nor hinted nor suggested by AAPA.

The Examiner also has rejected claim 1 on the grounds that it is obvious to combine the separate requester gather engine and responder gather engine of AAPA in a single gather engine, because (Office Action, page 18 third paragraph)

...when all of the essential elements of the claim(s) except integration of parts are found in the reference(s), the mere unity of parts is not considered to be an inventive concept.

The Examiner's observation is true generally, but not in this specific instance, because of the differences between the function and purpose of the AAPA requester gather engine and the function and purpose of the AAPA responder gather engine. The AAPA requester gather engine gathers data from local memory for clients running on the local host. The AAPA responder gather engine gathers data from local memory in response to requests such as RDMA read requests from remote requesters. The InfiniBand standard defines different protocols for locally initiated gathers vs. remotely initiated gathers. For example, locally initiated gathers may be from several virtually contiguous local buffer segments, whereas remotely initiated gathers must be from one virtually contiguous buffer. See lines 17-34 on the attached page 85 of InfiniBand Architecture Specification Volume 1 Release 1.0, October 24, 2000. For another example, locally initiated gathers and remotely initiated gathers use different keys: L\_keys for locally initiated gathers and R\_keys for remotely initiated gathers. See lines 3-14 of the attached page 73 of InfiniBand Architecture Specification Volume 1 Release 1.0, October 24, 2000. Because of these and other differences between locally initiated gathers and remotely initiated gathers under the InfiniBand standard, it would not occur to one ordinarily skilled in the art to combine the functionality of the AAPA requester gather engine and the functionality of the AAPA responder gather engine in a single gather engine.

The Examiner's observation also is not true in this specific instance because of the special nature of RDMA read requests. As described on page 3 lines 7-19, unlike other InfiniBand operations, the number of RDMA read requests that are outstanding at a HCA needs to be limited because (page 3 lines 15-16)

...each outstanding RDMA read request consumes a certain amount of memory on the HCA chip.

Because of this inherent difference between RDMA read requests and other InfiniBand operations, it would not occur to one ordinarily skilled in the art to combine the gather functionality of RDMA read responses with other gather functionality in the same gather engine.

#### **Double Patenting Rejection**

The Examiner has rejected claims 1, 4-9, 11, 12, 14, 16-31, 34-39, 41, 42, 44, 46-59 and 64-66 on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-10, 12-17 and 19-23 of co-pending US Patent Application Ser. No. 11/348,259 in view of Pettey et al. '712. The Examiner's rejection is respectfully traversed.

Attached please find a Terminal Disclaimer disclaiming the terminal part of the statutory term of any patent granted on the instant application, which would extend beyond the expiration date of the full statutory term, as shortened by any terminal disclaimer, of any patent granted on US 11/348,259.

In view of the above amendments and remarks it is respectfully submitted that independent claims 1 and 31, and hence dependent claims 4-9, 11, 12, 14, 16-30, 34-39, 41, 42, 44, 46-59 and 64-66 are in condition for allowance. Prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,



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